evolved as the result of the selection of favourable lines of variation; and the constant need of ready adaptation has even resulted in the acquirement of a relatively large "modulus of plasticity" (if the expression may be allowed) in the case of the individual plant, both in respect of its inner and of its outer characters. And it is just this, coupled with the admittedly adaptive nature of the tissues and their elements, which renders it difficult to appeal to the results of anatomical investigations in attempting to solve questions of affinity. But enough has been said to show that anatomical characters have each and all to be judged on their own independent merits; and if proper caution be employed in their discrimination, they are found, after all, to be not different in kind from the characters which are regularly employed by systematists. At the same time, as was said at the outset, it is assuredly the biological, rather than the (perhaps no less important) phylogenetic, aspect of anatomy which most forcibly appeals to the greater number of students, and it is from this point of view that the subject is treated by Prof. Haberlandt.

The new edition is in many respects a great improvement on the old one. It contains 550 pages as against 398, and the number of illustrations has been increased from 140 to 235. As regards the latter, however, it must be confessed that new blocks would have been a very great improvement, the sadly-worn figures in the present edition comparing very unfavourably with those of 1884.

The extension of the book has been chiefly due to the incorporation of new matter; but in several places we note that whole paragraphs have been recast in order to bring their contents into line with the present state of our knowledge. The book as it stands may fairly claim to be up to date, at any rate so far as German literature is concerned. We observe, however, that for the most part reference to work done in this country is conspicuous by its absence, and the name of one of the few English authors who are referred to appears (doubtless by an overlooked printer's error) under a Germanised form. But it would be ungracious to continue to pick holes in a work which in nearly every respect is admirable, alike in its method and its matter, and which will earn for its author the gratitude of all who are seriously interested n botany.

J. B. F.

EXPLORING IN THE NEW ZEALAND ALPS.

Pioneer Work in the Alps of New Zealand: a Record of the First Exploration of the Chief Glaciers and Ranges of the Southern Alps. By Arthur E. Harper, B.A. Pp. xvi + 336. With maps and illustrations. (London: T. Fisher Unwin, 1896.)

TRAVELLING in the Alps of New Zealand is much rougher and more difficult work than in those of Europe. Inns are all but unknown, chalets and club-huts non-existent; guides, even porters, not to be obtained; the weather is more unsettled and stormy. Mr. Harper is evidently the right man for the work. He is strong and enduring, patient and resolute, not daunted by difficulties or dangers. His opportunities for obtaining a knowledge of the Southern Alps of New Zealand have been exceptional, for, after making holiday expeditions in the Tasman district, from 1889 to 1892, he was employed by the Government, in the three following years, to explore the valleys and glaciers of the west coast of the south island. Thus his book differs from that by Mr. FitzGerald, which we lately noticed, in being one of exploration rather than of mountain climbing. On this point, as we can see from the present volume, and from a correspondence in the *Alpine Journal*, some little soreness has been created, particularly in regard to a certain pass lying to the north of Mount Sefton, by which the chain can be crossed without any serious difficulty.

Mr. Harper, in the earlier part of his book, gives an excellent description of the physical geography of the Southern Alps of New Zealand. As a mountain chain they resemble the Pyrenees more closely than the Alps of Europe; they are rather more elevated than the one, but distinctly lower than the other. Mount Cook, the culminating summit (which Mr. Harper tells us ought not to be called Aorangi, for it has no native name), only reaches 12,349 feet above sea level, about the height of the well-known Cima de Jazi in the Zermatt Alps. Yet, though the higher region of the Southern Alps lies between latitudes 43° and 45° S.—say, for instance, between Turin and the north end of Corsica—the snow-line comes down to between 6000 and 6500 feet, and occasionally, under rather exceptional circumstances, it is as low as 5000 feet. The same holds with the ice streams; the Tasman glacier on the eastern side ending at 2354 feet, and the Franz Josef, on the western, at only 692 feet above sea-level. But the mean annual temperature is nearly the same in both regions, so that the difference is mainly due to greater precipitation, which in the higher part of the ranges is probably equivalent to a rainfall of at least 140 inches, for it is 126 inches at Hokitika on the western coast.

Mr. Harper, as he regretfully admits, knows but little geology; still he is a close observer, and has placed on record some interesting facts about the New Zealand glaciers, their rate of motion and distribution. They also, as is well known, once extended far beyond their present limits; the erratics, which they have left in the Westland valleys, are often of enormous size, and the old moraines are on a great scale. One of the Cascade moraines once extended some distance out to sea. The glaciers from the mountains, in Mr. Harper's opinion, formerly debouched from the valleys, and spread out laterally on the lowland, either becoming confluent or, at any rate, covering a very large area; on their retreat they left both districts covered with huge piles of moraine débris, from which the valley terraces were cut by the rivers. The facts mentioned by Mr. Harper make this inference a very probable one. The Cascade moraine, he says, is stratified, and sea-shells are found in some of the layers well inland. A few more particulars about this stratification would have been welcome, especially as to its nature and height above the present sea level. Stratification, no doubt, is sometimes exhibited by the older moraines in the Swiss Alps; but this, so far as we have seen, is always faint. All talus heaps have a slight tendency to assume this structure, owing to a kind of sorting process which goes on among their materials; but the occurrence of marine shells seems to indicate a submergence, during which the ice terminated actually in

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the sea; for in this case the most enthusiastic glacialist can hardly summon an ice-sheet from the "vasty deep" to scrape shells from the sea-bottom, and deposit its collections at the foot of the New Zealand Alps.

Mr. Harper had ample opportunities of studying the natural history of the country, and of these he has made good use. The birds, especially the wekas (a kind of rail) and the keas (a mountain parrot), are still very common in some valleys, and are amusing on account of their insatiate curiosity. But from others they have disappeared almost entirely. Man is their destroyer, though not directly; for this has happened in districts which have hardly ever been visited. But the miner often keeps a cat, and, like the Londoner, is apt, when quitting an abode, to leave the animal behind; so it has to feed itself, and becomes a bush-ranger. Weasels also have been introduced into the island; so the birds of New Zealand, especially those which are poor flyers, are having a bad time. The shepherd will view with satisfaction the disappearance of the kea, since it destroys sheep. Mr. Harper explains how the bird has acquired carnivorous habits. The shepherds hang up the skins of sheep to dry, and the kea is an embodiment of inquisitiveness, and tries its beak on everything. If the skin has not been carefully cleaned, it tastes the fat, and "when once a kea tastes fat he is a ruined bird, and would sell his soul—if he had one—to get more." Apparently it is wise enough to know the exact position of the most savoury morsel, for the bird settles on the sheep's back, and bites down to the fat about the kidneys. But if some native birds are disappearing, black swans, an importation from Australia, have become abundant, and the rabbit, in certain districts, is getting to be as great a pest as in Australia. Let well alone, is a maxim often as sound in nature as it is in politics. But we must leave Mr. Harper's very interesting and abundantly illustrated volume. It is a valuable addition to our knowledge of the New Zealand Alps, and a well-told story of difficulties overcome and hardships endured with no little pluck and determination.

T. G. Bonney.

OUR BOOK SHELF.

Lehrbuch der Erdkunde für höhere Schulen. Von Dr. Willi Ule. II. Teil: Für die mittleren und oberen Klassen. Mit 12 farbigen und 79 Schwarzdruck-abbildungen. Pp. viii + 404. (Leipzig: G. Freytag, 1896.)

The author of this excellent little text-book has already made his mark in practical geographical work amongst the younger generation of German geographers. He marshals the facts and enforces the descriptions with a firm grasp of general principles which no mere theorist can attain. But he claims no novelty in method, and states that his book is out and out a child of Alfred Kirchhoff's school.

The perspective in which the world's surface is viewed from the German standpoint of Dr. Ule is somewhat interesting, as the following analysis of the space devoted to the different departments shows:—German Empire, 19 per cent.; Europe outside Germany, 31; Asia, 9; Africa, 7; North America, 3; South America, 3; Australasia and Oceania, 3; physical and general geography, 25 per cent. The small space devoted to North America is remarkable, considering the vast importance of the United States for German trade and as a centre for emigrants.

It would be too much to say that the revival of serious geographical study in this country has largely influenced the form of Dr. Ule's book, but it is a fact that his method of treatment approaches that of the most recent English text-books in several particulars. The illustrations are for the most part old friends, but the sketch maps introduced in the text are original and good.

A Manual of Elementary Seamanship. By D. Wilson-Barker. Pp. xii + 120. (London: Charles Griffin and Co., Ltd., 1896.)

This book will be found most useful and handy to the young sailor; for throughout its pages the subject is treated in a thorough manner.

The author does not limit himself to a description of the more general type, but enters into details respecting most parts of a ship, such as hull, rigging, sails, &c.; and not only are sailing ships dealt with, but steamers are treated in the same manner. Several Parts (ii. to iv.) are devoted to the art of rope splicing, knots, lead, log rigging, anchors, sail-making, sails, and the handling of boats under sail; these, we may add, are also profusely illustrated, thus enabling the reader to more easily grasp some of the explanations given.

A large figure is also inserted, showing the rigging and sails of a full-rigged ship. Part v., on the rule of the road and signalling, includes two excellent coloured plates of flags, and the semaphore, and Morse alphabets; the last two, we are sorry to say, are as yet seldom used in the mercantile marine, although their importance cannot in any way be overrated. The diagram also contains a scheme by which these can be easily remembered.

A useful glossary of sea terms and phrases is also added.

Researches upon the Antiquity of Man in the Delaware Valley and the Eastern United States. By Henry C. Mercer. Pp. 178. (Publications of the University of Pennsylvania, vol. vi. 1897.)

In this monograph, Mr. Henry C. Mercer, curator of the museum of American and Prehistoric Archæology at the University of Pennsylvania, brings together the results of his investigations of an Indian stone blade quarry in the Delaware Valley, a mortuary deposit of Indian skeletons in Maryland, certain shell heaps on the coast of Maine and at the Durham Cave, and a rock-shelter in the Delaware Valley.

The caves explored failed to give conclusive evidence of pre-Indian or geologically ancient man. It is held that nothing has as yet been found anywhere in the Delaware Valley to corroborate the alleged antiquity of the chipped blades from Trenton. Support is given to Mr. W. H. Holmes' contention that the flint specimens from the Trenton gravel are not true implements, but "wasters" or "rejects" cast away by modern Indians whose village sites occupied the surface above the gravel.

Numerous illustrations of specimens from the caves explored accompany the monograph.

The Universal Electrical Directory (J. A. Berly's). Pp. 1114. (London: Alabaster, Gatehouse, and Co., 1897.)

This well-known Directory contains the names of the members of the electrical and kindred industries throughout the world. It is thus invaluable for finding the addresses of electricians, manufacturers, and dealers. The total number of distinct names in the Directory is 22,658, of which 9933 belong to British individuals and firms. For simplicity and facility of reference the names are divided into four groups—namely: British, Continental,

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